



Europäisches Patentamt
European Patent Office
Office européen des brevets



Publication number: **0 250 207 B1**

EUROPEAN PATENT SPECIFICATION

Date of publication of patent specification: **10.06.92** Int. Cl.⁵: **A47C 1/032, A47C 3/026**

Application number: **87305331.8**

Date of filing: **16.06.87**

Improvements in and relating to adjustable chairs.

Priority: **16.06.86 GB 8614651**

Date of publication of application:
23.12.87 Bulletin 87/52

Publication of the grant of the patent:
10.06.92 Bulletin 92/24

Designated Contracting States:
BE DE ES FR GB IT NL SE

References cited:
FR-A- 2 461 472
US-A- 4 502 729

Proprietor: **Mines & West Business Furniture Limited**
Plomer Green Lane Downley
High Wycombe, Buckinghamshire HP13
5TX(GB)

Inventor: **Reed, Adrian Michael**
30 Bloomfield Road Plumstead
London, SE18 7JH(GB)

Representative: **Harrison, Philippa Dinah et al**
A. A. THORNTON & CO Northumberland
House 303-306 High Holborn
London WC1V 7LE(GB)

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid (Art. 99(1) European patent convention).

Description

The present invention relates to improvements in adjustable chairs.

Reclinable chairs, adjustable between an upright position in which the seated person can sit upright, and a reclined position in which the rear of the seat portion is lowered and the backrest portion is tilted backwards to tilt the seated person backwardly against the backrest position, can be uncomfortable in the reclined position. This is because the front edge of the seat portion tends to dig into the back of the seated person's knees or legs, causing pressure points which reduce the circulation of blood in the person's lower legs, resulting in discomfort.

The reclinable chairs disclosed in FR-A-2461472 have two support members extending between, and pivotally connected to, the chair base and the seat portion. These members, with the seat portion and the base, form a quadrilateral linkage allowing the chair to be reclined. When the chair is reclined, both the support members pivot at both their ends. The connection of the rearward support member to the seat portion lowers to increase the rearward inclination of the seat portion. The connection of the forward support member to the seat portion either rises or remains in the same vertical plane, depending on the embodiment. Accordingly, in the reclinable chairs of FR-A-2461472, the front edge of the seat portion either stays at the same height as the chair is reclined, or increases in height.

The reclinable chairs disclosed in US-A-4502729 do not disclose quadrilateral linkages of the type in FR-A-2461472. The forward support member is fixed relative to the chair base and forms a point of connection to the seat portion which is vertically fixed. The rearward support member is pivotally connected to both the chair base and the seat portion. When the chair is reclined, only the point of pivotal connection of the rearward member to the seat portion moves vertically, causing the front edge of the seat portion to rise and the rear to lower.

It is thought that one of the main causes of discomfort with reclinable chairs of the type disclosed in FR-A-2461472 and US-A-4502729, is the front edge of the seat portion either remaining at the same height, or rising, as the chair is reclined.

According to the present invention there is provided a chair comprising a base, a seat and means adjustably mounting the seat on the base, the seat comprising a seat portion and a backrest portion and the adjustable mounting means comprising a forward support member, a rearward support member, and pivotal connection means for pivotally connecting each support member to the

base and to the seat portion for pivotal movement relative to the base and the seat portion about generally horizontal axes extending transversely of the seat portion, the support members forming opposite sides of a quadrilateral linkage, the other sides of which are provided by the base and seat portion, which extends generally between the front and rear of the seat portion and which permits movement of the seat portion relative to the base between forward and rearward positions, characterised in that the quadrilateral linkage is arranged so that, as the seat portion is moved from its forward to its rearward position, the axes of the pivotal connection means of both the support members to the seat portion move downwardly as well as rearwardly, the axis of the pivotal connection means of the rearward support member to the seat portion moving downwardly by a greater amount than the axis of the pivotal connection means of the forward support member to the seat portion.

The downward movement of the pivotal connections of both the support members to the seat portion, when the seat portion is moved rearwardly, lowers the front edge of the seat portion when the chair is reclined, so overcoming the problems inherent in the chairs of FR-A-2461472 and US-A-4502729.

The backrest portion may be connected for movement with one of the support members so as to move relative to the seat with movement of the seat portion relative to the base.

The quadrilateral linkage is advantageously arranged to cause the angle between the backrest portion and the seat portion to decrease as the seat portion moves from its rearward position to its forward position.

The chair may include stop means for limiting movement of the seat portion relative to the base. Resilient means for biasing the seat portion to its forward position may also be provided. The resilient means may be adjustable to adjust the biasing force and may be lockable to lock the chair in any desired position. Alternatively, the locking means may be provided separately from the biasing means.

An embodiment according to the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic side elevation of an embodiment of a chair in accordance with the present invention, showing the chair in two positions; and

Figure 2 is a diagrammatic front elevation of the chair of Figure 1, showing the chair in the position shown in solid lines in Figure 1.

The chair shown in the drawings comprises a base 1, a seat 2, comprising a seat portion 3 and a

backrest portion 4, and adjustable mounting means 5 for adjustably mounting the seat 2 on the base 1 and permitting the seat to move between the positions shown in full and broken lines in Figure 1.

In Figures 1 and 2, the seat and backrest portions 3, 4 are shown diagrammatically and in use of the invention may comprise a load bearing part, which may be in the form of a frame work or, as shown, a shell, which may for example be moulded. The load bearing part may be cushioned and upholstered.

As shown, the base 1 comprises an upright 6 which is supported on the ground by any suitable means. As shown, upright 6 is supported by a plurality of generally radially extending legs 7 provided at their ends with castors or glides 8. Upright 6 may be rotatable and adjustable in length relative to legs 7. Cantilevered from the upper end of upright 6 is a pair of fixed support members 9 between which and the seat portion 3 the adjustable mounting means 5 are connected. It will be appreciated that the base 1 may take other conventional forms. For example, it may comprise four legs interconnected by a framework which provides one or two fixed support members equivalent to members 9.

The adjustable mounting means 5 comprise two support members 10,11, each of which is connected to the member 9 of the base and to the seat portion 3 for pivotal movement relative thereto about generally horizontal axes 12,13,14 and 15 which extend transversely of the seat portion 3. Support members 10,11 form the opposite sides of a quadrilateral linkage of which the other sides are provided by base support member 9 and seat portion 3 and which, as shown, extends generally centrally between the front and rear of the seat portion 3. The distances between axes 12 and 13, 13 and 15, 15 and 14, and 14 and 12 are arranged so that seat portion 3 will, as shown in Figure 1, move relative to base 1 between a lower rearward position, shown in full lines in Figure 1 in which the seat portion may be generally rearwardly inclined, and a raised forward position, shown in broken lines in Figure 1, in which the seat portion may be substantially horizontal or slightly forwardly inclined.

The back rest portion 4 is advantageously connected for movement with the rearward support member 11 so that it has a fixed orientation relative to member 11 and as a consequence pivots relative to seat portion 3 as seat portion 3 is moved relative to base 1. The quadrilateral linkage is designed so that, as seat portion 3 moves from its rearward position to its forward position, the angle between the seat portion and the back rest portion decreases. When the seat portion is in its forward position, the back rest portion may be generally

vertical.

As shown, resilient biasing means are provided, for biasing the seat portion to its forward position and counterbalancing the weight of the user so that the seat portion will move to its rearward position under the control of the user and specifically by the user repositioning himself in the chair. As shown, the resilient biasing means 16 acts generally between axes 13 and 14 of the quadrilateral linkage, and is in the form of a "gas spring", one end of which is pivotally connected to the seat portion 3 in the region of axis 14 and the other end of which is pivotally connected to upright 6 with the line of action of the "gas spring" approximately passing through axis 13. The gas spring may be arranged to provide an adjustable bias, for adjustment by the user depending on the user's weight, and it may also be provided with a manually operable lock so that the user can lock the seat portion in a required position relative to the base. The gas spring 16 incorporates limits on its extension and contraction and these provide stops for limiting movement of the seat portion 3 relative to the base.

In the embodiment shown, support members 10 and 11 are provided at each end with transversely projecting portions 10a,11a, the ends of which have blind bores for receiving stub shafts about which the members 10,11 pivot and which define the axes 12 to 15. At the lower ends of the members 10,11, the stub shafts are mounted in base members 9 with the members 10,11 extending from between the members 9. At their upper ends, the stub shafts are mounted in a similar pair of support members 17 which are fixed to the underside of the seat portion 3.

It will be appreciated that the biasing means may take other forms. For example, they may be provided by an adjustable torsion spring or bar incorporated in one or more of the pivot axes 12 to 15 of the quadrilateral linkage, or a tension or compression spring acting between opposed pairs of axes of the linkage. Advantageously, the biasing means are adjustable to permit adjustment to take account of varying user weights. Additionally, stop means for limiting movement of the seat portion relative to the base may be, as shown, provided by the biasing means, or may be provided separately. For example, components of the quadrilateral linkage may be brought into abutment in the limit positions of the linkage. Additionally, locking means, where provided, for locking the seat portion in a desired position relative to the base portion, may, as shown be incorporated in the biasing means or may be provided separately, for example in the form of a mechanical lock acting on one or more of the pivot axes.

It will be appreciated from the foregoing that

numerous modifications may be made to the dimensions of the quadrilateral linkage, in its positioning and orientation relative to the base 1, and in relation to the numbers of support members 10,11 which are used in the linkage.

In relation to the positioning and orientation of the linkage relative to the base 1, in a modification, both of axes 12 and 13 are positioned further to the rear of the chair with the members 10,11 extending forwardly therefrom to their pivotal connections with the seat portion, member 11 being longer than member 10. With such a modification, it is not possible to connect the back rest portion with one of the links 10,11 and it therefore has a fixed position relative to the seat portion.

In relation to the numbers of members 10,11 provided, it will be appreciated that members 10,11 may be duplicated and extend to either side of single members 9,17. In a further modification, member 11 may be replaced by a pair of members extending between pivot axes 13 and 15 but each shaped to form a loop between these pivot axes and which serve as the arm rests of the chair.

Claims

1. A chair comprising a base (1), a seat (2) and means (5) adjustably mounting the seat on the base, the seat comprising a seat portion (3) and a backrest portion (4) and the adjustable mounting means (5) comprising a forward support member (10), a rearward support member (11), and pivotal connection means for pivotally connecting each support member (10,11) to the base (1) and to the seat portion (3) for pivotal movement relative to the base and the seat portion about generally horizontal axes (12,13,14,15) extending transversely of the seat portion (3), the support members forming opposite sides of a quadrilateral linkage, the other sides of which are provided by the base (1) and seat portion (3), which extends generally between the front and rear of the seat portion and which permits movement of the seat portion relative to the base between forward and rearward positions, characterised in that the quadrilateral linkage is arranged so that, as the seat portion (3) is moved from its forward to its rearward position, the axes (14,15) of the pivotal connection means of both the support members (10,11) to the seat portion (3) move downwardly as well as rearwardly, the axis (15) of the pivotal connection means of the rearward support member (11) to the seat portion (3) moving downwardly by a greater amount than the axis (14) of the pivotal connection means of the forward support member (10) to the seat portion (3).

2. A chair as claimed in claim 1, wherein the backrest portion (4) is connected for movement with one of the support members (11) so as to move relative to the seat portion (3) with movement of the seat portion relative to the base (1).

3. A chair as claimed in claim 1 or claim 2, wherein the quadrilateral linkage is arranged to cause the angle between the backrest portion (4) and the seat portion (3) to decrease as the seat portion (3) moves from its rearward position to its forward position.

4. A chair as claimed in any one of the preceding claims, including stop means for limiting movement of the seat portion (3) relative to the base (1).

5. A chair as claimed in any one of the preceding claims, including biasing means (16) for biasing the seat portion to its forward position and for permitting the seat portion (3) to move to its rearward position in use.

6. A chair as claimed in claim 5, wherein the biasing means (16) act on one of the pivotal connection means.

7. A chair as claimed in claim 5 or 6, wherein the biasing means (16) act between an opposite pair of the pivotal connection means.

8. A chair as claimed in any one of the preceding claims, including locking means for fixing the seat portion (3) relative to the base (1) in a desired position.

9. A chair as claimed in claim 8, wherein the locking means are associated with the biasing means (16).

10. A chair as claimed in any of the preceding claims, wherein the biasing means (16) comprises a member (16) having a variable length which is pivotally connected to the seating portion (3) in the region of the axis of the pivotal connection means of the forward support member (10) to the seat portion (3) and to the base (1) in the region of the axis of the pivotal connection means of the rearward pivotal support member (11) to the base (1).

11. A chair as claimed in claim 10, wherein the biasing member (16) includes releasable locking means for preventing variation in the length thereof.

12. A chair as claimed in any of the preceding claims, wherein the distance between the axes (13,15) of the pivotal connection means of the rearward support member (11) is longer than the distance between the pivot axes (12,14) of the pivotal connection means of the forward connecting member (10).

13. A chair as claimed in claim 12, wherein the support members (10,11) extend rearwardly from the pivotal connection means thereof to the base (1) towards the pivotal connection means thereof to the seat portion (3).

Revendications

1. Chaise comprenant une base (1), un siège (2) et des moyens (5) permettant le montage réglable du siège sur la base, le siège comprenant une partie formant siège (3) et une partie formant dossier (4), et les moyens de montage réglable (5) comprenant un élément de support antérieur (10), un élément de support postérieur (11) et des moyens de liaison pivotants pour relier en pivotement chaque élément de support (10, 11) à la base (1) et à la partie formant siège (3) en vue d'un mouvement de pivotement par rapport à la base et à la partie formant siège autour d'axes (12, 13, 14, 15) généralement horizontaux qui s'étendent transversalement par rapport à la partie formant siège (3), les éléments de support formant des côtés opposés d'un système de liaison quadrilatéral dont les autres côtés sont formés par la base (1) et par la partie formant siège (3), qui s'étend généralement entre l'avant et l'arrière de la partie formant siège et qui permet un mouvement de la partie formant siège par rapport à la base entre des positions antérieure et postérieure, caractérisée en ce que le système de liaison quadrilatéral est conçu de telle façon que, lorsque la partie formant siège (3) est déplacée de sa position antérieure dans sa position postérieure, les axes (14, 15) du moyen de liaison pivotant des deux éléments de support (10, 11) et de la partie formant siège (3) se déplacent vers le bas et vers l'arrière, l'axe (15) du moyen de liaison pivotant de l'élément de support postérieur (11) et de la partie formant siège (3) se déplaçant vers le bas d'une quantité plus importante que l'axe (14) de l'élément de liaison pivotant de l'élément de support antérieur (10) et de la partie formant siège (3).
2. Chaise selon la revendication 1, dans laquelle la partie formant dossier (4) est reliée en vue d'un mouvement à l'un des éléments de sup-

port (11) de façon à se déplacer par rapport à la partie formant siège (3) avec un mouvement de la partie formant siège par rapport à la base (1).

3. Chaise selon la revendication 1 ou la revendication 2, dans laquelle le système de liaison quadrilatéral est conçu de façon que l'angle entre la partie formant dossier (4) et la partie formant siège (3) diminue lorsque la partie formant siège (3) se déplace de sa position postérieure dans sa position antérieure.

4. Chaise selon l'une quelconque des revendications précédentes, comprenant des moyens d'arrêt pour limiter le mouvement de la partie formant siège (3) par rapport à la base (1).

5. Chaise selon l'une quelconque des revendications précédentes, comprenant des moyens de sollicitation préalable (16) pour solliciter au préalable la partie formant siège dans sa position antérieure et pour permettre à la partie formant siège (3) de se déplacer dans sa position postérieure lors de son utilisation.

6. Chaise selon la revendication 5, dans laquelle les moyens de sollicitation préalable (16) agissent sur l'un des moyens de liaison pivotants.

7. Chaise selon la revendication 5 ou 6, dans laquelle les moyens de sollicitation préalable (16) agissent entre deux moyens de liaison pivotants opposés.

8. Chaise selon l'une quelconque des revendications précédentes, comprenant des moyens de blocage pour fixer dans une position souhaitée la partie formant siège (3) par rapport à la base (1).

9. Chaise selon la revendication 8, dans laquelle les moyens de blocage sont associés aux moyens de sollicitation préalable (16).

10. Chaise selon l'une quelconque des revendications précédentes, dans laquelle les moyens de sollicitation préalable (16) comprennent un élément (16) de longueur variable qui est relié à pivotement à la partie formant siège (3) dans la région de l'axe du moyen de liaison pivotant de l'élément de support antérieur (10) et de la partie formant siège (3) et à la base (1) dans la région de l'axe du moyen de liaison pivotant de l'élément de support pivotant postérieur (11) et de la base (1).

11. Chaise selon la revendication 10, dans laquelle

l'élément de sollicitation préalable (16) comprend des moyens de blocage desserrables pour empêcher sa longueur de varier.

12. Chaise selon l'une quelconque des revendications précédentes, dans laquelle la distance entre les axes (13, 15) du moyen de liaison pivotant de l'élément de support postérieur (11) est plus grande que la distance entre les axes de pivotement (12, 14) du moyen de liaison pivotant de l'élément de liaison antérieur (10).

13. Chaise selon la revendication 12, dans laquelle les éléments de support (10, 11) s'étendent à l'arrière de leurs moyens de liaison pivotants avec la base (1) en direction de leurs moyens de liaison pivotants avec la partie formant siège (3).

Patentansprüche

1. Stuhl mit einer Basis (1), einem Sitz (2) und einer Einrichtung (5), die den Sitz einstellbar an der Basis anbringt, wobei der Sitz einen Sitzbereich (3) und einen Lehnbereich (4) aufweist und die einstellbare Anbringeinrichtung (5) ein Vorwärtsstützteil (10), ein Rückwärtsstützteil (11) und Schwenkverbindungseinrichtungen aufweist, zum schwenkbaren Verbinden eines jeden Stützteils (10, 11) mit der Basis (1) und mit dem Sitzbereich (3) für eine Schwenkbewegung bezüglich des Basis- und des Sitzbereichs um allgemein horizontale Achsen (12, 13, 14, 15), die sich quer zum Sitzbereich (3) erstrecken, wobei das Stützteil gegenüberliegende Seiten einer Vierseitverbindung bildet, wobei die anderen Seiten durch die Basis (1) und den Sitzbereich (3) gebildet werden, der sich im allgemeinen zwischen dem vorderen und dem hinteren Sitzbereich erstreckt, und der eine Bewegung des Sitzbereichs bezüglich der Basis zwischen einer vorderen und einer rückwärtigen Stellung erlaubt, **dadurch gekennzeichnet**, daß die Vierseitverbindung so angeordnet ist, daß, wenn der Sitzbereich (3) von seiner vorderen in seine rückwärtige Stellung bewegt wird, die Achsen (14, 15) der Schwenkverbindungseinrichtung der beiden Stützteile (10, 11) zu dem Sitzbereich (3) sowohl nach unten als auch nach rückwärts sich bewegen, wobei die Achse (15) der Schwenkbewegungseinrichtung des rückwärtigen Stützteils (11) zu dem Sitzbereich (3) sich nach unten bewegt um einen größeren Betrag als die Achse (14) der Schwenkverbindungseinrichtung des vorderen Stützteils (10) zu dem Sitzbereich (3).
2. Stuhl nach Anspruch 1, wobei der Lehnbereich (4) zur Bewegung mit einem der Stützteile (11) verbunden ist, um sich bezüglich des Sitzbereichs (3) zu bewegen unter Bewegung des Sitzbereichs bezüglich der Basis (1).
3. Stuhl nach Anspruch 1 oder 2, wobei die Vierseitverbindung derart angeordnet ist, um den Winkel zwischen dem Lehnbereich (4) und dem Sitzbereich (3) zu vermindern, wenn der Sitzbereich (3) sich von seiner rückwärtigen Stellung in seine Vorwärtsstellung bewegt.
4. Stuhl nach einem der vorhergehenden Ansprüche, der eine Arretiereinrichtung zum Begrenzen der Bewegung des Sitzbereichs (3) bezüglich der Basis (1) umfaßt.
5. Stuhl nach einem der vorhergehenden Ansprüche, mit einer Beaufschlagungseinrichtung (16) zum Drücken des Sitzbereichs in seine vordere Stellung und um zu Erlauben, daß sich der Sitzbereich (3) bei Verwendung in seine rückwärtige Stellung bewegt.
6. Stuhl nach Anspruch 5, wobei die Beaufschlagungseinrichtung (16) auf eine der Schwenkverbindungseinrichtungen wirkt.
7. Stuhl nach Anspruch 5 oder 6, wobei die Beaufschlagungseinrichtung (16) zwischen einem gegenüberliegenden Paar der Schwenkbewegungseinrichtungen wirkt.
8. Stuhl nach einem der vorhergehenden Ansprüche, mit Sperreinrichtungen zum Festlegen des Sitzbereichs (3) bezüglich der Basis (1) in einer gewünschten Stellung.
9. Stuhl nach Anspruch 8, wobei die Sperreinrichtungen den Beaufschlagungseinrichtungen (16) zugeordnet sind.
10. Stuhl nach einem der vorhergehenden Ansprüche, wobei die Beaufschlagungseinrichtung (16) ein eine variierbare Länge aufweisendes Teil (16) aufweist, das schwenkbeweglich mit dem Sitzbereich (3) im Bereich der Achse der Schwenkverbindungseinrichtung des vorderen Stützteils (10) mit dem Sitzbereich (3) und zu der Basis (1) im Bereich der Achse der Schwenkbewegungseinrichtung des rückwärtigen Schwenkstützteils (11) mit der Basis (1) verbunden ist.
11. Stuhl nach Anspruch 10, wobei die Beaufschlagungseinrichtung (16) eine lösbare Sperreinrichtung aufweist, um deren Längenverände-

zung zu verhindern.

12. Stuhl nach einem der vorhergehenden Ansprüche, wobei der Abstand zwischen den Achsen (13, 15) der Schwenkverbindungseinrichtungen des rückwärtigen Stützteils (11) größer ist als der Abstand zwischen den Schwenkachsen (12, 14) der Schwenkbewegungseinrichtungen des vorderen Verbindungsteils (10). 5
- 10
13. Stuhl nach Anspruch 12, wobei die Stützteile (10, 11) sich von deren Schwenkbewegungseinrichtungen mit der Basis (1) nach hinten zu deren Schwenkbewegungseinrichtungen mit dem Sitzbereich (3) erstrecken. 15

20

25

30

35

40

45

50

55

7

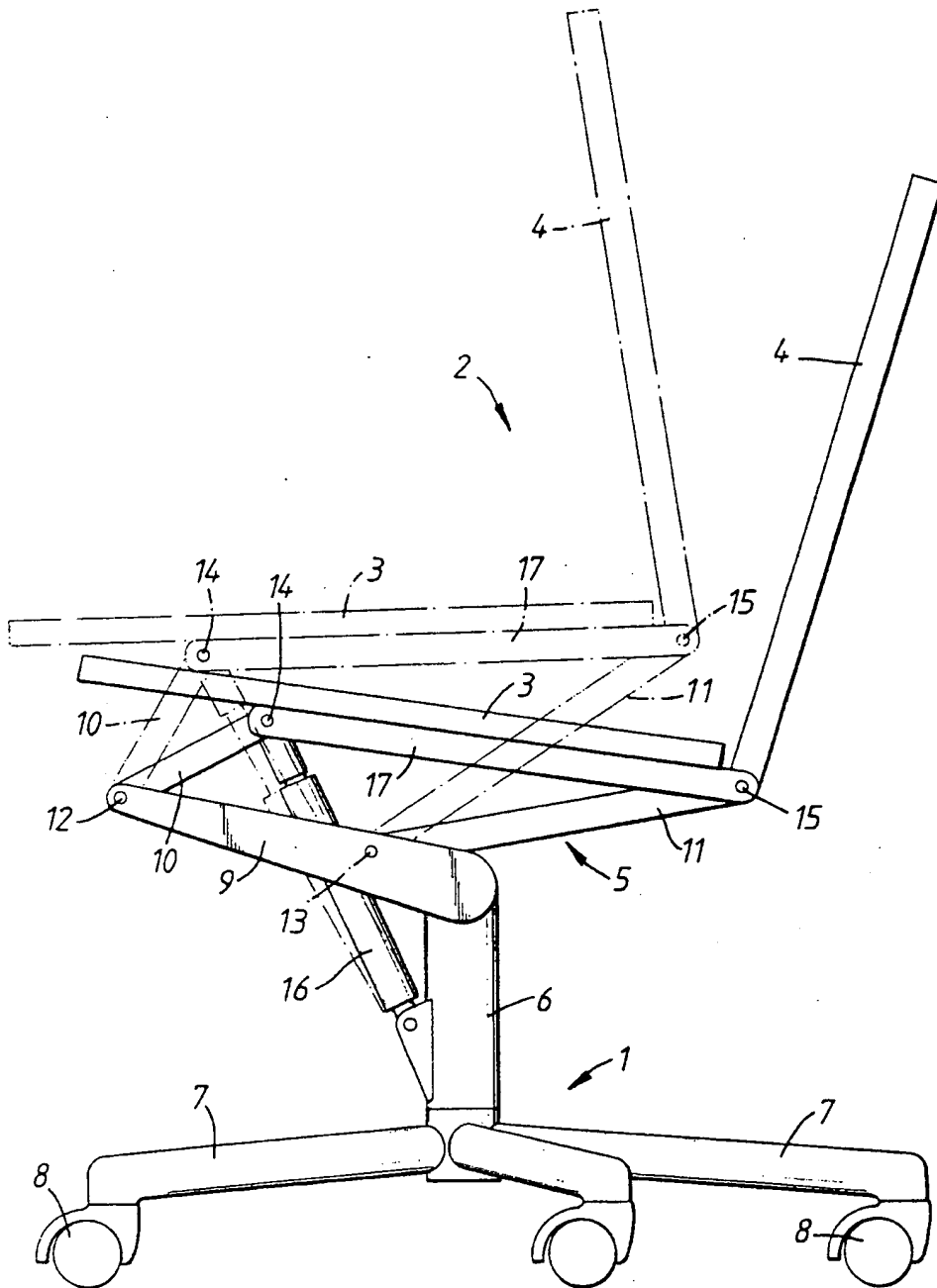


FIG. 1.

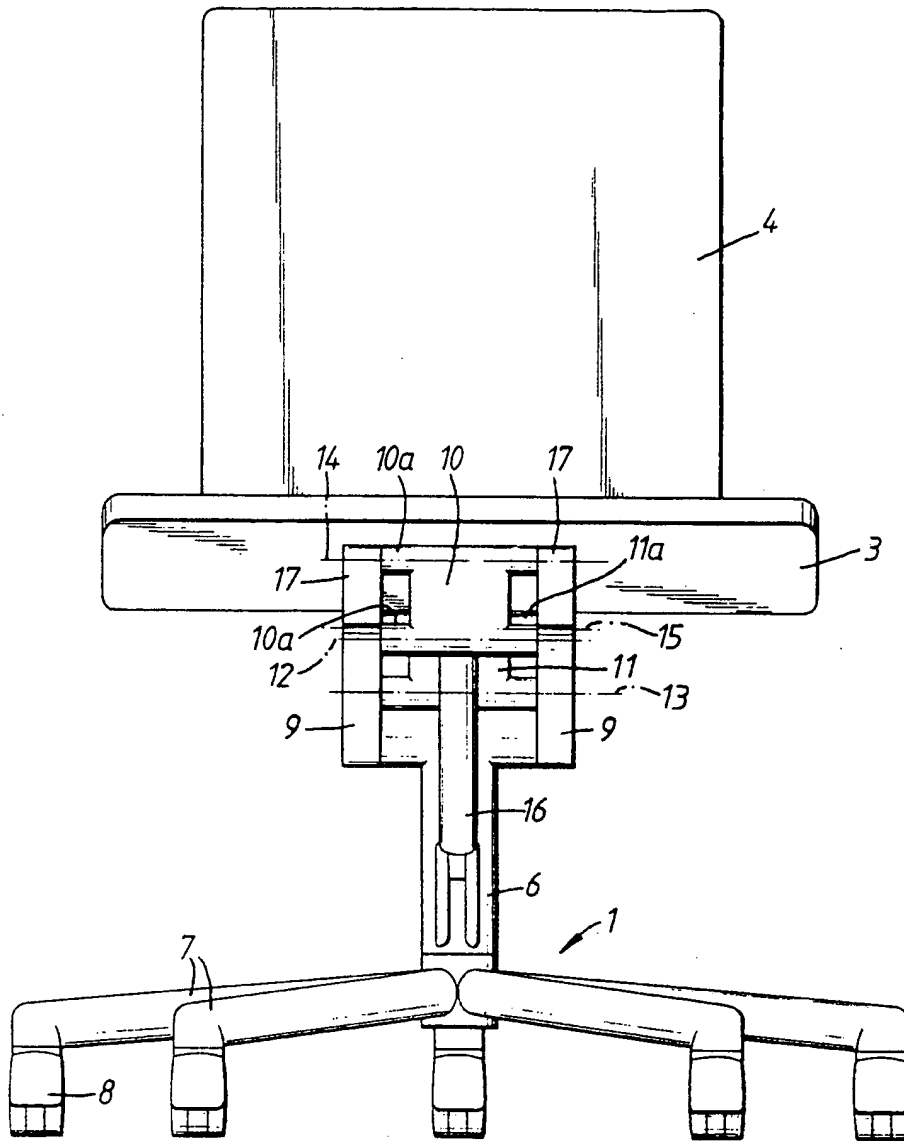


FIG. 2.